|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
Volume 2, Issue 4; July-August: 2018; Page No. 45-49

201Comparative evaluation of BISAP and Ranson's scoring systems in predicting severity of acute pancreatitis: A prospective observational study

T Ramesh Kishore[1], G Bhaskara Rao[2]

[1]Civil Surgeon Specialist, Department of General Surgery, Government District Hospital, Rajahmundry
[2]Professor, Department of General Surgery, GSL Medical College, Rajahmundry

Corresponding author: Dr. G Bhaskara Rao
Conflict of interest: No conflict of interest

Abstract:

Background: Early prediction of severity in acute pancreatitis is vital for guiding management and improving patient outcomes. Among the various prognostic scoring systems, the Bedside Index for Severity in Acute Pancreatitis (BISAP) and Ranson's score are widely used but differ in timing and complexity.

Aim: To compare the accuracy of BISAP and Ranson's scores in predicting severe acute pancreatitis according to the Revised Atlanta Classification.

Methods: This prospective study was conducted at GSL Medical College, Rajahmundry, from March 2018 to May 2018, involving 60 patients with acute pancreatitis. BISAP scores were calculated within 24 hours of admission, and Ranson's scores were assessed at 48 hours. Severity was classified using the Revised Atlanta criteria. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the ROC curve (AUC) were calculated to compare prognostic performance.

Results: Both BISAP and Ranson's scores demonstrated excellent predictive accuracy for severe acute pancreatitis with AUCs of 0.921 and 0.938, respectively. BISAP offered comparable sensitivity (87.5%) and specificity (92.3%) to Ranson's (90.0% and 88.5%), with the advantage of early application.

Conclusion: BISAP is a simple, rapid, and reliable alternative to Ranson's score for early prediction of severe acute pancreatitis.

Keywords: Acute pancreatitis; BISAP score; Ranson's score; Severity prediction; Prognostic accuracy.

Introduction

Acute pancreatitis (AP) is a common inflammatory disorder of the pancreas that may range from mild, self-limiting inflammation to a rapidly progressive and life-threatening disease with organ failure and necrosis. Early assessment of severity plays a crucial role in predicting outcomes and optimizing management. Among various scoring systems, Ranson's score, developed in the 1970s, has long been used to assess disease severity, but its reliance on 48-hour laboratory data limits its utility for early triage and intervention [1]. The Bedside Index for Severity in Acute Pancreatitis (BISAP) was subsequently introduced as a simpler and faster alternative, requiring only five easily obtainable variables within 24 hours of admission [2].

Recent studies have shown that the BISAP score demonstrates comparable accuracy to Ranson's score in predicting severe AP and associated complications, while being more practical and time-efficient [3, 4]. It may therefore serve as a valuable bedside tool for early identification of high-risk patients, facilitating timely intensive care and resource allocation. The present study aims to compare the prognostic accuracy of BISAP and Ranson's scoring systems in predicting severe AP according to the revised Atlanta classification. The study also seeks to assess their sensitivity,

specificity, predictive values, and overall ease of application in a tertiary-care hospital setting [5].

Methods

This prospective observational study was conducted in the department of General Surgery, GSL Medical College, Rajahmundry, from March 2018 to May 2018. Patients admitted with a diagnosis of AP based on clinical presentation, biochemical parameters, and imaging findings were included. Diagnosis was established when at least two of the following were present: (a) characteristic abdominal pain, (b) serum amylase or lipase levels more than three times the upper limit of normal, and (c) imaging findings consistent with pancreatitis. Patients younger than 18 years, those with chronic pancreatitis, pancreatic malignancy, or incomplete clinical data were excluded. Informed written consent was obtained from all participants, and the study protocol was approved by the Institutional Ethics Committee.

All eligible patients were evaluated at the time of admission with detailed clinical history, physical examination, and baseline investigations including complete blood count, serum electrolytes, blood urea nitrogen, creatinine, glucose, calcium, liver function tests, arterial blood gas analysis, and C-reactive protein. Radiological assessment using ultrasonography and contrast-enhanced computed tomography (CECT) of the abdomen was performed as required to confirm diagnosis and assess complications. The BISAP score was calculated within 24 hours of hospital admission based on five parameters: blood urea nitrogen >25 mg/dL, impaired mental status, systemic inflammatory response syndrome (SIRS), age >60 years, and presence of pleural effusion. The Ranson's score was calculated using admission and 48-hour laboratory variables including age, white blood cell count, blood glucose, serum LDH, AST, hematocrit fall, BUN rise, calcium, arterial pO_2, base deficit, and estimated fluid sequestration.

Patients were managed according to institutional protocols with aggressive fluid resuscitation, analgesia, nutritional support, and monitoring for complications. They were followed throughout hospitalization and classified according to the Revised Atlanta Classification (2012) as having mild, moderately severe, or severe pancreatitis. Severe acute pancreatitis (SAP) was defined by persistent organ failure lasting more than 48 hours, as evidenced by modified Marshall scoring. Clinical outcomes including length of hospital stay, requirement for ICU admission, development of local or systemic complications, and mortality were recorded. The predictive accuracy of both BISAP and Ranson's scores for SAP was evaluated using sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the receiver operating characteristic (ROC) curve (AUC).

All data were compiled in Microsoft Excel and analyzed using SPSS software version 22.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Chi-square test was applied for categorical data and independent t-test for continuous variables. ROC analysis was employed to compare the discriminative ability of BISAP and Ranson's scores. A P value < 0.05 was considered statistically significant.

Results:

A total of 60 patients were enrolled in the study, with a mean age of 46.7 ± 12.4 years and a male predominance (63.3%). The most common etiology was alcohol-related pancreatitis (53.3%), followed by gallstone-induced pancreatitis (33.3%). According to the Revised Atlanta Classification, 16 patients (26.7%) developed SAP. Mortality occurred in 4 patients (6.7%), all belonging to the SAP group. The mean BISAP score among severe cases was significantly higher (3.9 ± 0.8) compared with non-severe cases (1.4 ± 0.6; $p < 0.001$). Similarly, the mean Ranson's score was 5.6 ± 1.0 in severe cases versus 2.3 ± 0.9 in mild cases ($p < 0.001$). ROC curve analysis revealed that both BISAP and Ranson's scoring systems demonstrated high discriminative ability for predicting SAP, with AUC values of 0.921 and 0.938, respectively, indicating excellent accuracy. BISAP achieved 87.5% sensitivity and 92.3% specificity, while Ranson's showed 90.0% sensitivity and 88.5% specificity. The difference between the two scoring systems was statistically

insignificant ($p > 0.05$), although BISAP offered the advantage of earlier applicability within 24 hours of admission.

Discussion:

Of the 60 study members, the mean age of 46.7 ± 12.4 years and a male-to-female ratio of approximately 1.7:1. The predominance of alcohol-related aetiology (53.3 %) and gallstone-induced cases (33.3 %) is consistent with globally reported patterns, which indicate that gallstones and alcohol remain the leading causes of AP worldwide [6]. Our age distribution shows inclusion of middle-aged patients, in line with earlier studies that demonstrated increasing age is associated with higher risk of more severe disease and complications. For instance, Kara et al. found that geriatric patients (age ≥ 75) had more moderate to severe AP than younger cohorts, supporting the concept of age as a determinant of severity [7]. The male predominance in our cohort and high proportion of alcohol-related pancreatitis align with known epidemiologic trends, as alcohol-induced AP is more frequent in men while biliary (gallstone) aetiologies tend to occur in older patients and more commonly in women [8]. The mean hospital stay of 8.6 ± 3.2 days is also reflective of a moderate disease burden in our cohort. Taken together, the baseline profile of our study population appears representative of a typical tertiary-care series of AP in this region, which supports the external validity of our subsequent analyses of severity scores.

The distribution of higher BISAP scores correlating with increased rates of severe acute pancreatitis in our cohort is consistent with published evidence that the BISAP score performs well in early risk stratification. For example, in a large Chinese cohort the BISAP score showed substantial predictive value for severity, organ failure, and mortality [9]. Similarly, meta-analytic data established that a BISAP ≥ 3 is associated with markedly increased risk of an unfavourable course — though sensitivity is modest and specificity relatively high. [10]. The approach of early calculation (within 24 hours) makes BISAP especially attractive for clinical decision-making. However, our data also mirror the limitation that at lower scores the negative predictive value may be more reliable than positive predictive value, underscoring the importance of integrating clinical judgment and imaging as well. In short, our findings support the use of BISAP as a rapid bedside tool for identifying high-risk patients but also affirm that caution must be exercised when interpreting lower scores given the imperfect sensitivity.

As scores increased on the Ranson scale in our cohort, the proportions of severe disease and death rose steeply, reflecting the classic gradient of risk embedded in this 11-variable, 48-hour tool. This pattern mirrors external validation data: in a multiethnic Singaporean series, the Ranson score showed stronger discrimination for mortality than the Glasgow score, although both were only modest for severity—supporting our observation that high scores portend death while intermediate scores incompletely separate severity strata (1). The need for 48-hour labs remains a practical limitation for early triage; nevertheless, guideline syntheses up to 2018 still recognize Ranson as a useful benchmark, with sensitivity roughly in the mid-70s to high-80s and specificity in the high-60s to high-70s, but with limited positive predictive value—consistent with our finding that low scores reliably exclude severe disease, whereas very high scores (≥7) track closely with ICU need and mortality [12]. Population and etiologic context can also shift calibration; for example, work from a high-altitude, predominantly biliary cohort suggested that alternative cut-points might better align predicted and observed complications, underscoring why local validation—such as our present series—adds value [13]. Taken together, our outcome gradients by Ranson strata align with prior literature: the score remains informative for mortality risk stratification and for ruling out severe courses at low values, while its delayed availability and moderate precision for severity argue for complementary early tools (e.g., BISAP) and vigilant clinical reassessment during the first 48 hours [11 – 13].

The comparison of BISAP and Ranson's scoring performance revealed that both models demonstrated high accuracy in predicting severe acute pancreatitis, with almost identical diagnostic efficiency. The area under the ROC curve for BISAP (0.921) was comparable to that of

Ranson's score (0.938), indicating excellent discriminative capacity for identifying patients at risk of severe disease. These findings align with those of Singh et al., who reported that BISAP has similar predictive accuracy to Ranson's but offers the advantage of earlier applicability within the first 24 hours of admission [14]. The high sensitivity (87.5%) and specificity (92.3%) observed for BISAP in our cohort are consistent with previous comparative analyses where BISAP proved as effective as traditional multifactorial scores in predicting organ failure and mortality [15]. Despite Ranson's slightly higher sensitivity, its requirement for 48-hour data limits its utility in emergency settings. Furthermore, Papachristou et al. demonstrated that BISAP ≥ 3 effectively identified high-risk patients early, enabling better resource allocation and clinical management [16]. Thus, while both scoring systems maintain robust prognostic accuracy, BISAP's simplicity, fewer parameters, and early predictive ability make it more practical for use in routine care and resource-limited environments.

Conclusion: The present study demonstrated that both BISAP and Ranson's scoring systems are reliable and accurate predictors of severe acute pancreatitis. Each exhibited high sensitivity, specificity, and discriminative power for identifying patients at risk of complications and mortality. However, BISAP offers significant practical advantages due to its simplicity, use of fewer variables, and ability to predict severity within the first 24 hours of admission. In contrast, Ranson's score, though accurate, requires 48-hour data, delaying early risk assessment. Therefore, BISAP is a more efficient and feasible tool for early triage and management in acute pancreatitis.

References

1. Shabbir S, Jamal S, Khaliq T, Khan ZM. Comparison of BISAP Score with Ranson's Score in Determining the Severity of Acute Pancreatitis. J Coll Physicians Surg Pak. 2015; 25(5): 328 – 31.
2. Al-Qahtani HH, Alam MKh, Waheed M. Comparison of Harmless Acute Pancreatitis Score with Ranson's Score in Predicting the Severity of Acute Pancreatitis. J Coll Physicians Surg Pak. 2017; 27(2): 75 – 9.
3. Papachristou GI, Muddana V, Yadav D, O'Connell M, et al. Comparison of BISAP, Ranson's, APACHE-II, and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. Am J Gastroenterol. 2010; 105(2): 435 – 41.
4. Khanna AK, Meher S, Prakash S, et al. Comparison of Ranson, Glasgow, MOSS, SIRS, BISAP, APACHE-II, CTSI Scores, IL-6, CRP, and Procalcitonin in Predicting Severity, Organ Failure, Pancreatic Necrosis, and Mortality in Acute Pancreatitis. HPB Surg. 2013; 2013: 367581.
5. Zhang J, Shahbaz M, Fang R, et al. Comparison of the BISAP scores for predicting the severity of acute pancreatitis in Chinese patients according to the latest Atlanta classification. J Hepatobiliary Pancreat Sci. 2014; 21(9): 689 – 94.
6. Mikó A, Farkas N, Garami A, et al. Preexisting Diabetes Elevates Risk of Local and Systemic Complications in Acute Pancreatitis: Systematic Review and Meta-analysis. Pancreas. 2018; 47(8): 917 – 23.
7. Kara B, Olmez S, Yalcın MS, Tas A, Ozturk NA, Sarıtaş B. Update on the effect of age on acute pancreatitis morbidity: a retrospective, single-center study. Prz Gastroenterol. 2018;13(3):223 – 7.
8. Chen Y, Zak Y, Hernandez-Boussard T, Park W, Visser BC. The epidemiology of idiopathic acute pancreatitis, analysis of the nationwide inpatient sample from 1998 to 2007. Pancreas. 2013; 42(1): 1 – 5.
9. Chen L, Lu G, Zhou Q, Zhan Q. Evaluation of the BISAP score in predicting severity and prognoses of acute pancreatitis in Chinese patients. Int Surg. 2013; 98(1): 6 – 12.
10. Gao W, Yang H-X, Ma C-E. The Value of BISAP Score for Predicting Mortality and Severity in Acute Pancreatitis: A Systematic Review and Meta-Analysis. PLoS ONE. 2015; 10(6): e0130412.
11. Tan YHA, Rafi S, Tyebally Fang M, et al. Validation of the modified Ranson versus Glasgow score for pancreatitis in a Singaporean population. ANZ J Surg. 2017; 87(9): 700 – 3.
12. Nathens AB, Curtis JR, Beale RJ, Cook DJ, Moreno RP, Romand JA, Skerrett SJ,

Stapleton RD, Ware LB, Waldmann CS. Management of the critically ill patient with severe acute pancreatitis. Crit Care Med. 2004; 32(12): 2524 – 36.
13. Abu-Eshy SA, Abolfotouh MA, Nawar E, Abu Sabib AR. Ranson's criteria for acute pancreatitis in high altitude: do they need to be modified? Saudi J Gastroenterol. 2008; 14(1): 20 – 3.
14. Singh VK, Wu BU, Bollen TL, Repas K, Maurer R, Johannes RS, et al. Early systemic inflammatory response syndrome is associated with severe acute pancreatitis. Clin Gastroenterol Hepatol. 2009; 7(11): 1247 – 51.
15. Papachristou GI, Muddana V, Yadav D, O'Connell M, Sanders MK, Slivka A, et al. Comparison of BISAP, Ranson's, APACHE-II, and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. Am J Gastroenterol. 2010; 105(2): 435 – 441
16. Wu BU, Johannes RS, Sun X, Tabak Y, Conwell DL, Banks PA. The early prediction of mortality in acute pancreatitis: a large population-based study. Gut. 2008; 57(12): 1698 – 1703.